CHAPTER 15: MASTER CLAMP/LOADING SECTION

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1. Theory of Operation

1. Master Making Unit Set Mechanism

1. Master Making Unit Set Switch

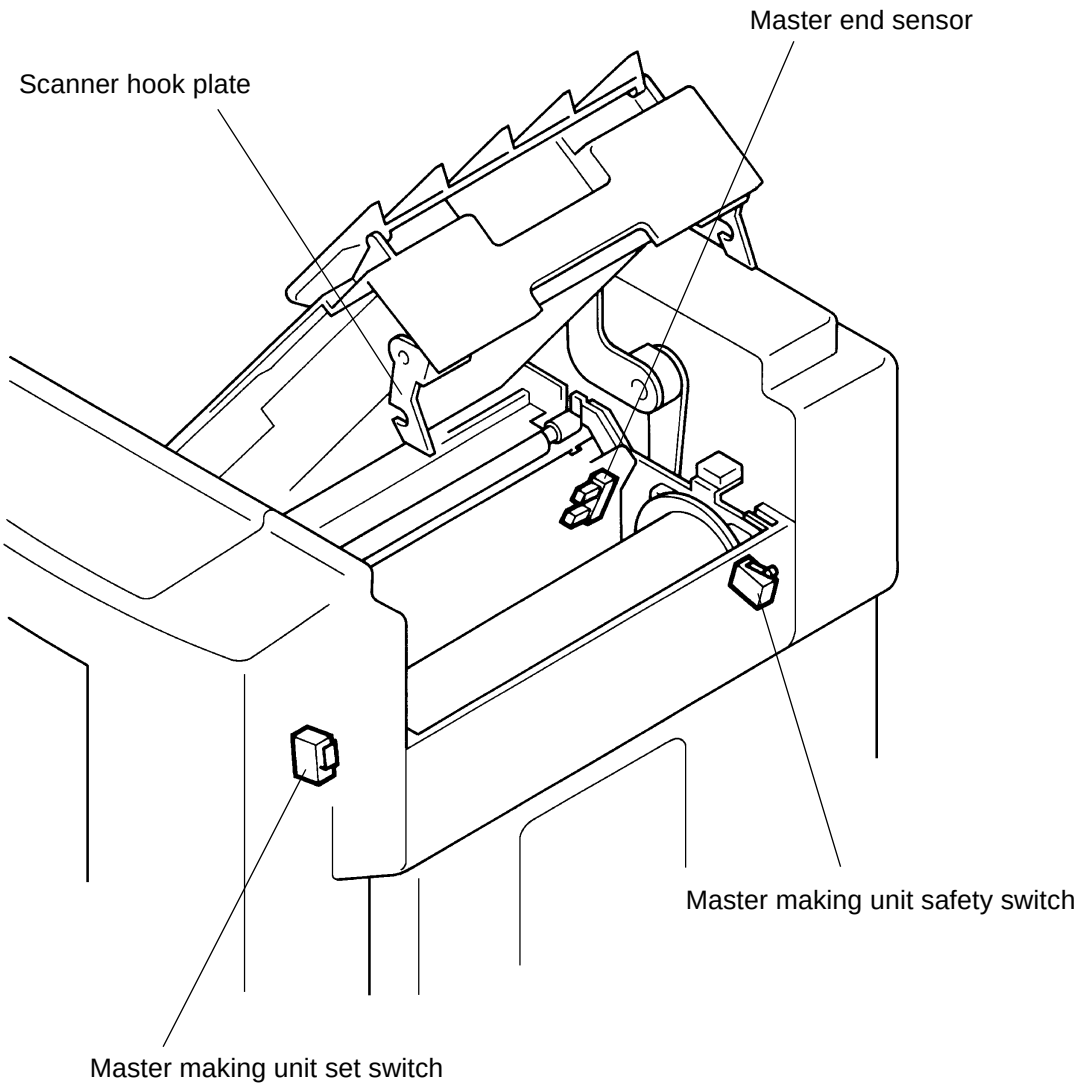
- The Master making unit set switch checks whether the Master making unit is opened or closed.
- The Scanner hook plate pushes against the actuator of the Master making unit set switch when the Master making unit is closed.
  When the switch is not pressed, the "Close Master making unit" message, **[C 58]** is indicated .

2. Master Making Unit Safety Switch

- When the Master making unit is closed, the Master making unit safety switch is also pressed by the Scanner hook plate the same time the Master making unit set switch is pressed.
  When the switch is not pressed, the power to the Main motor and TPH is terminated.

3. Master End Sensor

- The Master end sensor detects the black strip on the master material at the very end of the master roll and indicates the "Replace master roll" message, **[C 42]**.



2. Master Tension Plate Home Positioning Mechanism

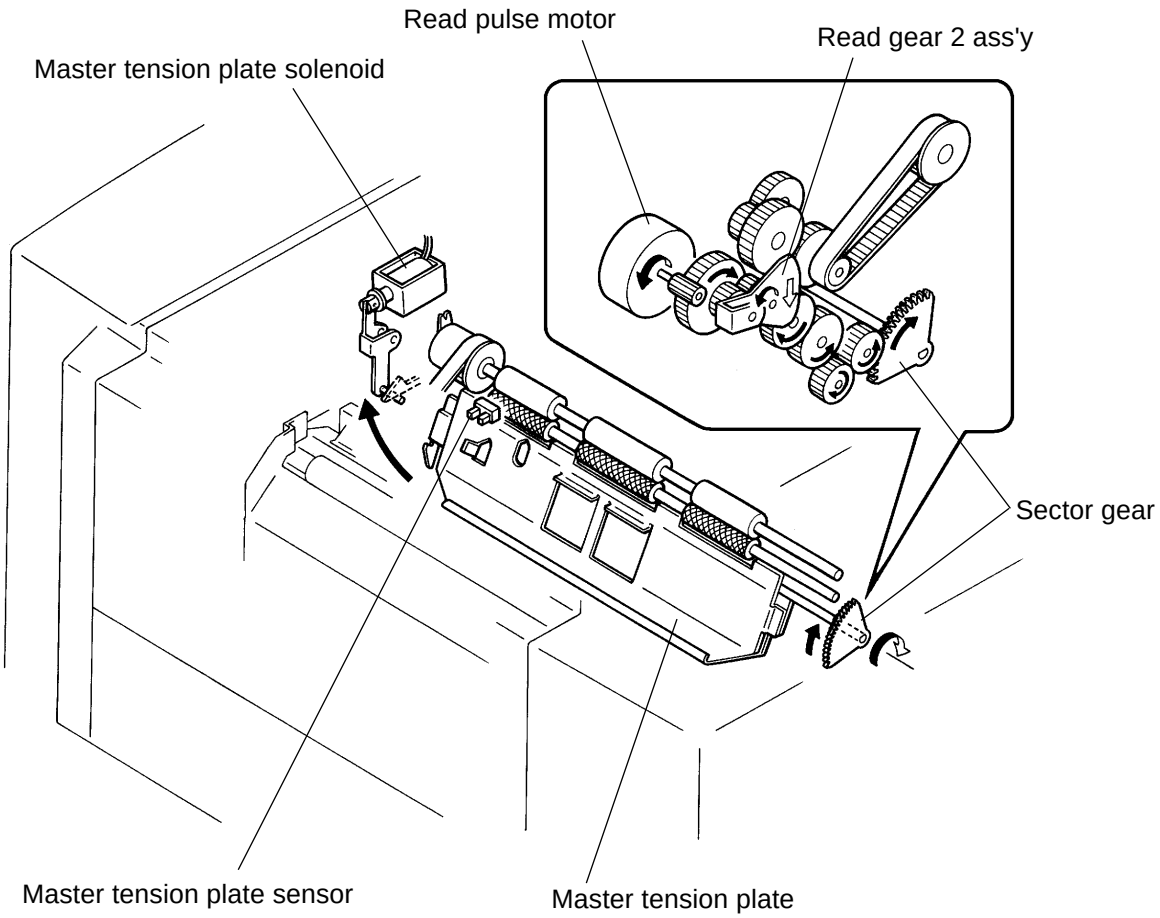
The Home position of the Master tension plate is when the plate is raised.
Master tension plate home positioning movement is made when the machine power is turned ON, All Reset button is pressed, master making Start button is pressed, or Master making unit is closed.
The Master making unit must be closed (the Master making unit set switch is pressed) in order for this initializing movement to take place.

1. Master Tension Plate Sensor

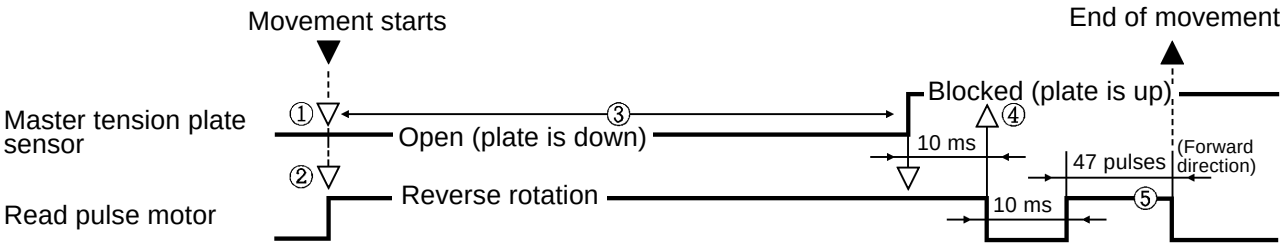
- The sensor checks whether the plate is up at the home position when any of the above four actions are taken.
  If the light path of the sensor is free (the plate is down), the Master tension plate home positioning movement is made to raise the plate.

2. Read pulse motor

- First, the Read pulse motor rotates in the opposite direction to the normal Original feeding and moves the Read gear 2 ass'y down.
- The Read gear 2 ass'y transfers the Read pulse motor drive to the Sector gear via four gears in between.
- With the rotation of the Sector gear, the Master tension plate lifts up.
- When the Master tension plate blocks the light path of the Master tension plate sensor, the Read pulse motor stops, and then 10 ms later the motor rotates in the normal Original feeding direction for 47 pulses to return the Read gear 2 ass'y to the up position and completes the Master tension plate home positioning movement.



Master Tension Plate Home Positioning Timing Chart



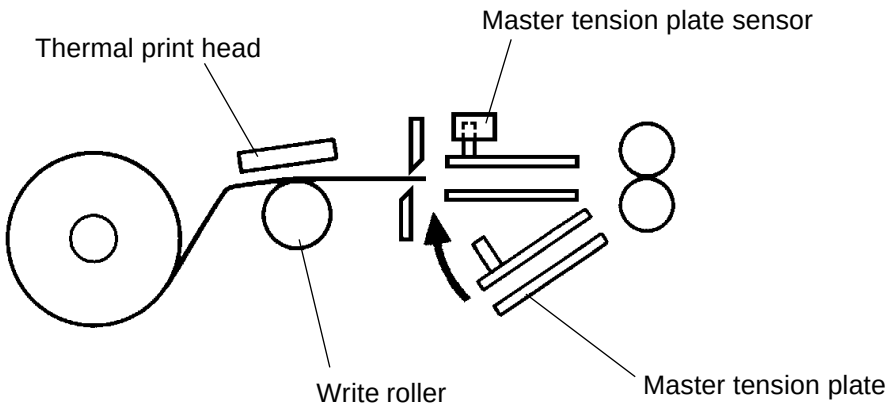
① If the Master tension plate is already in "Blocked" condition (plate is up), this home positioning movement is skipped.

② The Read pulse motor rotates in the reverse direction (reverse to the normal original feeding direction) and lifts the Master tension plate up.

③ If the Master tension plate sensor is not blocked within 384 pulses after the Read pulse motor is activated, the machine assumes the Master tension plate is locked and indicates the error message **[E 15]**.

④ If the Master tension plate sensor is still in "Open" condition after the Read Pulse motor stops, the machine repeats the home positioning movements and checks the condition of the Master tension plate sensor again.
If the Master tension plate sensor is still found to be in "Open" condition, the machine assumes the Master tension plate is locked and indicates the error message **[E 15]**.

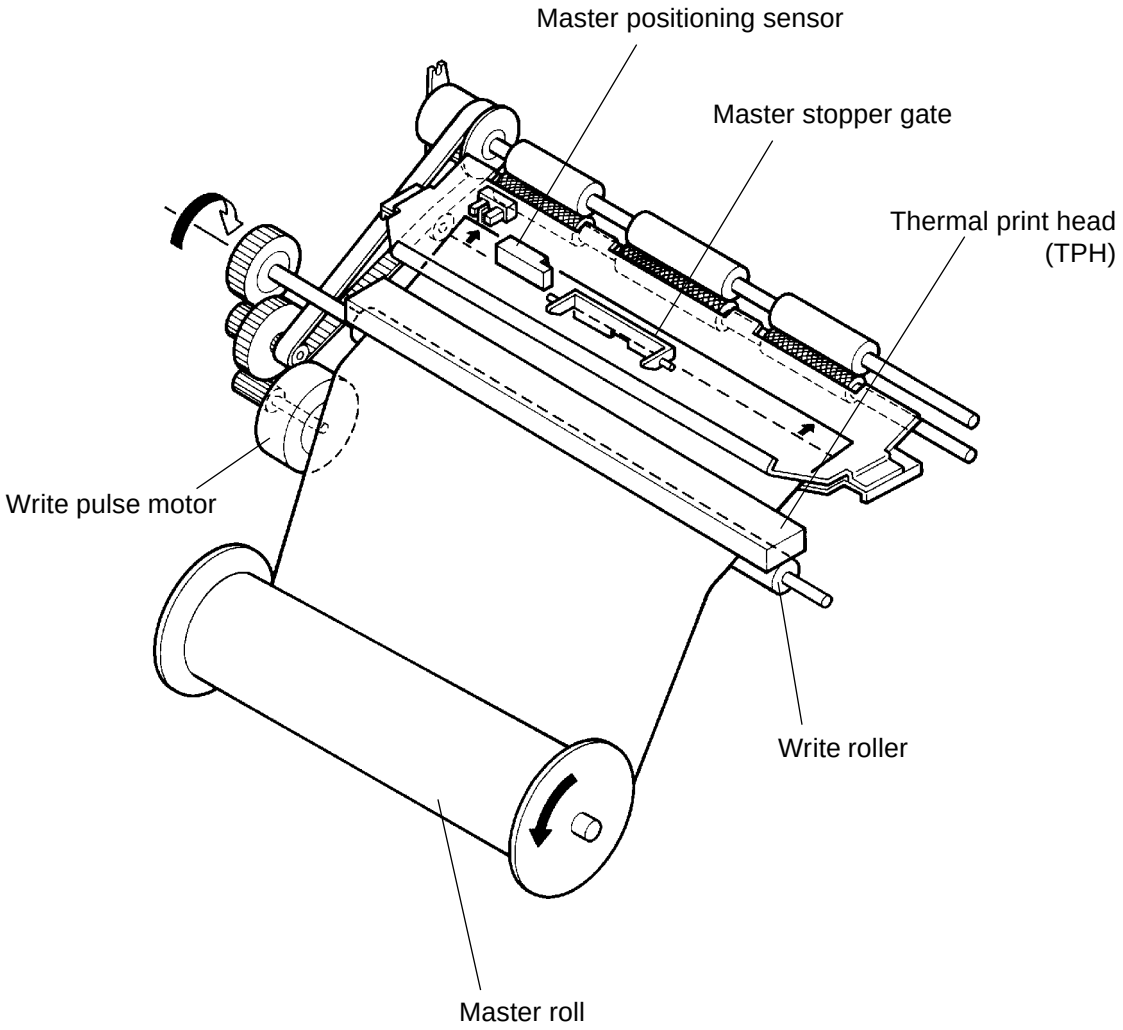
⑤ The Read pulse motor rotates in the forward direction (original feeding direction) to engage the Read gear 2 ass'y to the gears which feeds the original.



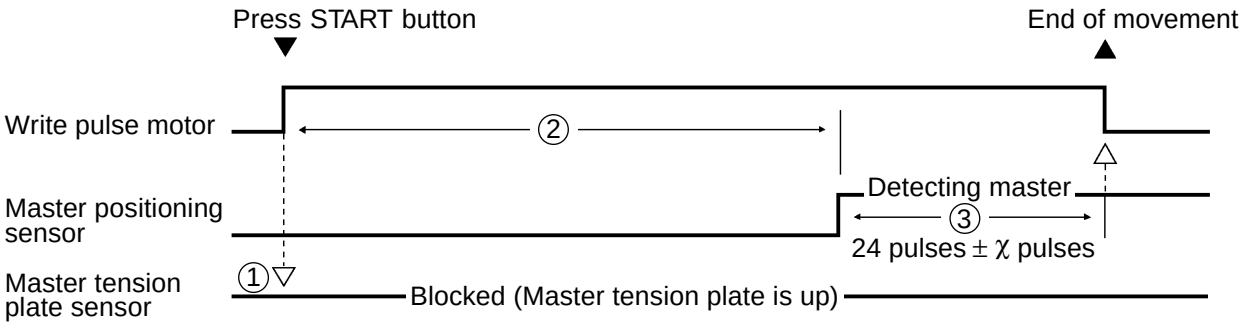
3. Master Positioning Mechanism

1. Master Positioning

- The leading edge of the master material rests against the Master stopper gate just after the master loading.
  When the Master making unit is closed the Master stopper gate is moved out of the way.
- As the START button is pressed for normal master making or confidential master making, the Write pulse motor activates and rotates the Write roller to feed the master material.
- When the Master positioning sensor detects the leading edge of the master, the Write pulse motor turns OFF and completes the master positioning movement.



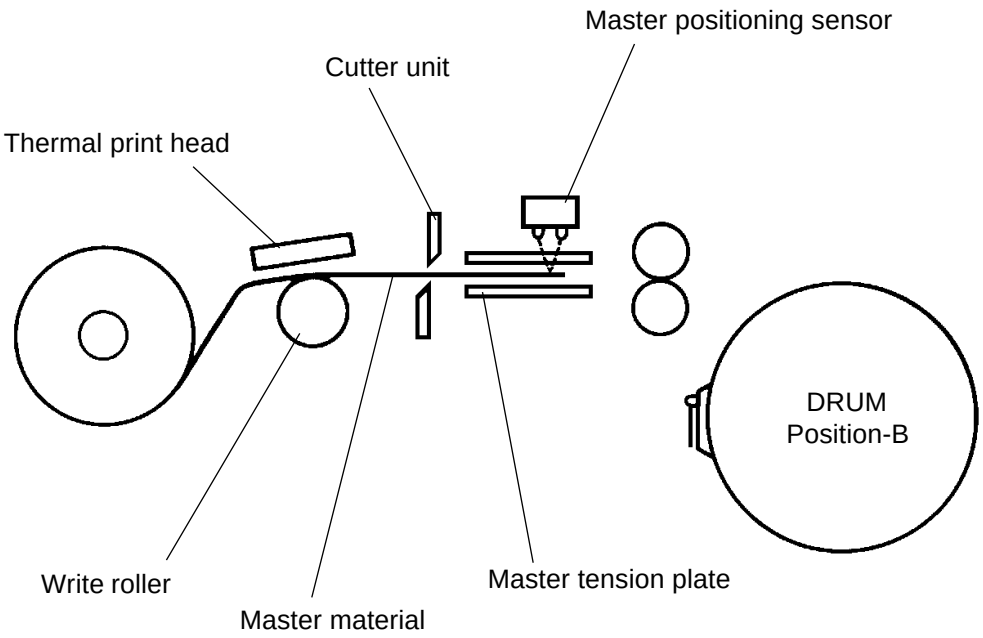
Master Positioning Timing Chart



① Checks the position of the Master tension plate when the START button is pressed.
If the Master tension plate is still down, the machine indicates Master Mis-Feed message **[C 22]**.

② If the light of Master positioning sensor is not reflected back (no master detection) within 944 pulses after the activation of the Write pulse motor, the machine assumes master mis-feed has occurred and indicates the message **[C 22]**.

③ By using Memory switch **No. 213** (Test mode No. 213), the "χ" pulses can be adjusted.
- When this "χ" is adjusted, the amount of master material moved to the Drum is also changed automatically to keep the amount of the master clamped under the Clamp plate constant.



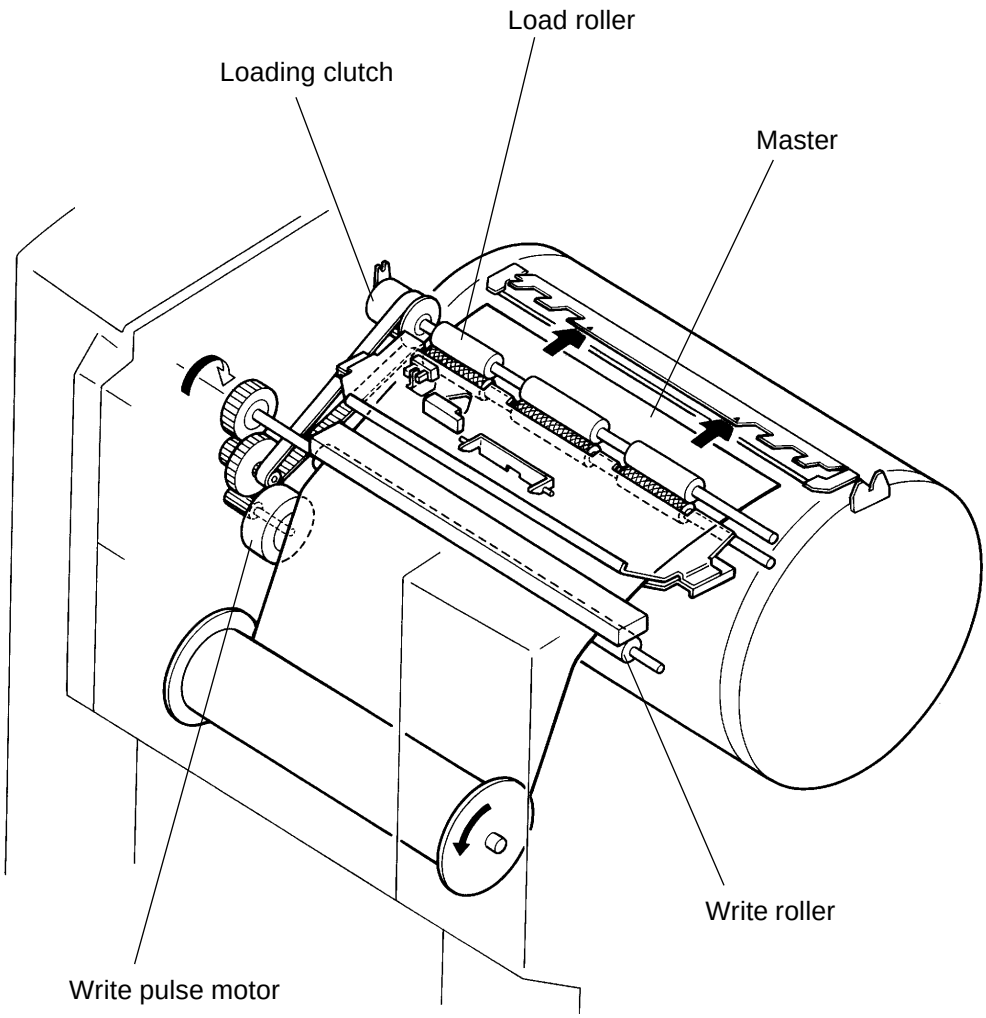
4. Master Feeding Mechanism

1. Start of Master Feeding

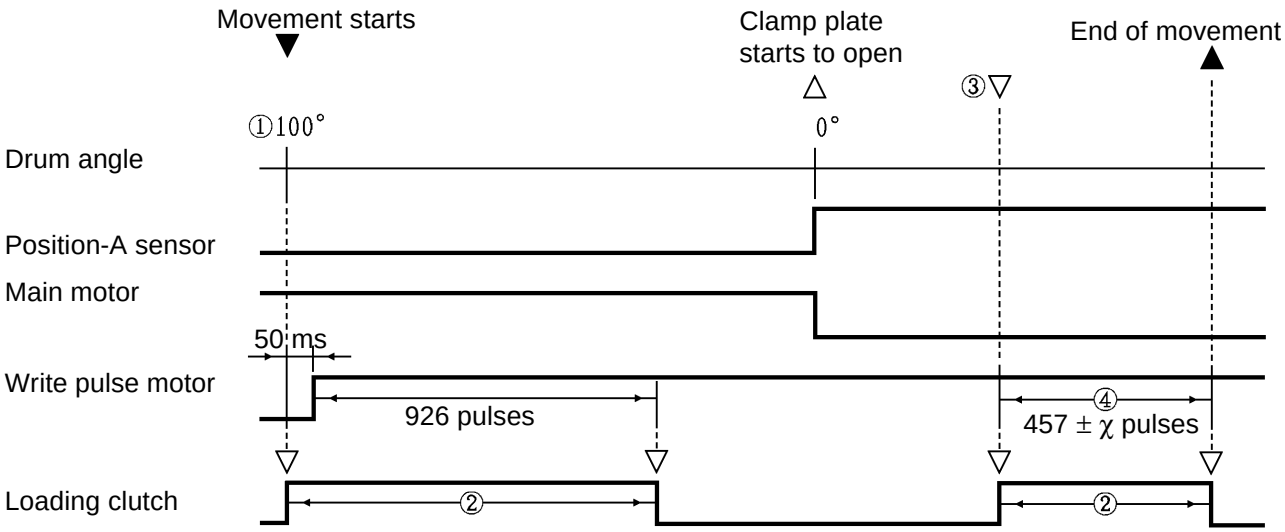
- The Loading clutch activates when the Drum rotates 100° from the Position-A during the master removal movement.
- 50 ms after the Loading clutch activates, the Write pulse motor activates to rotates the Write roller and Load roller to feed the master material.
- The Load roller rotates only when the Loading clutch is activated to transfer the drive of the Write pulse motor.

2. End of Master Feeding

- The Loading clutch turns OFF after the Write pulse motor rotates for a given amount and completes the master feeding operation.
  The leading edge of the master rests under the Clamp plate.
  The Write pulse motor keeps rotating to continue the master making.



Master Feeding Timing Chart

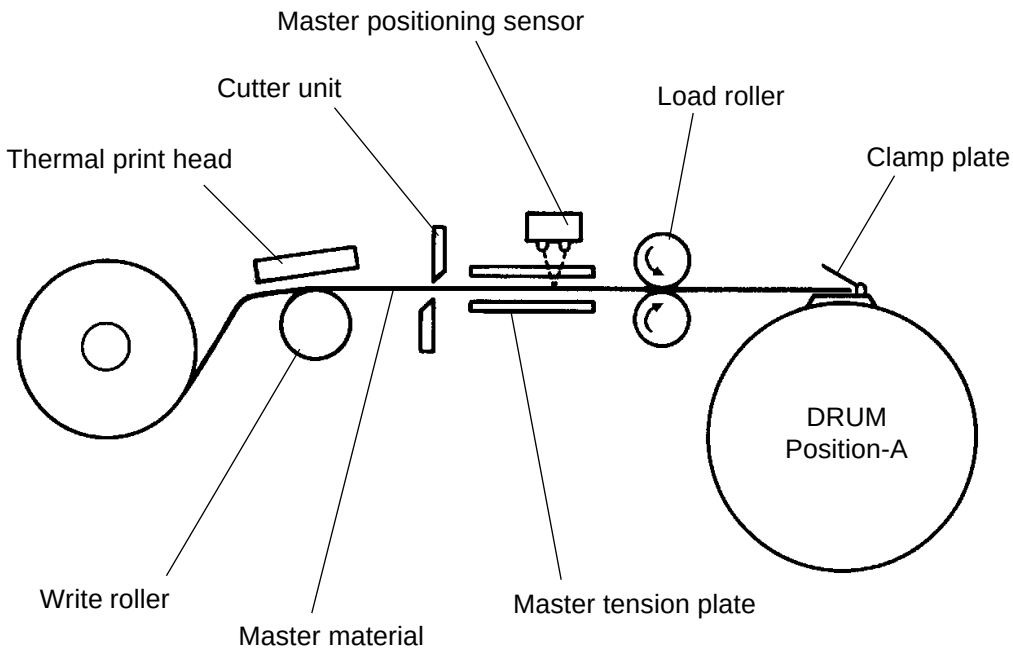


① The Loading clutch activates at Drum angle **100**° during master from Drum removal movement, and **50 ms** later, the Write pulse motor activates to send the master material towards the Drum.

② The Master is fed to the Drum by the Load roller driven by the Write pulse motor while the Loading clutch is activated.

③ The Loading clutch is activated again when the Clamp plate opens and the Clamp motor stops. The master is then carried to the Drum, until the leading edge of the master is under the Clamp plate.

④ By using Memory switch **No. 214** (Test mode No. 214), the **"χ" pulses** can be adjusted to change the amount of the master material clamped under the Clamp plate.
Memory switch **No. 213** (Test mode No.213) changes the value of **457 pulses** itself.



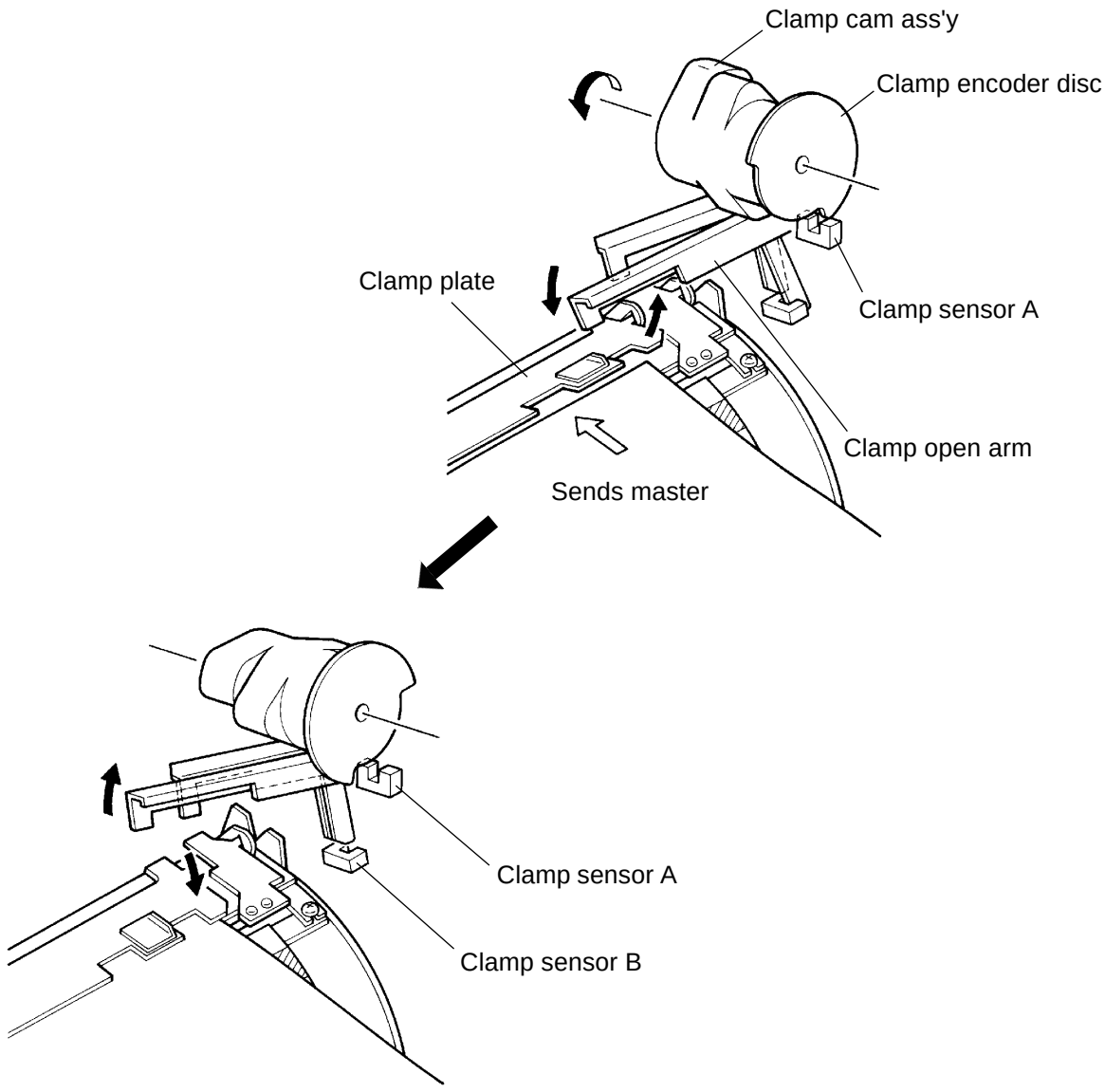
5. Clamp Plate Master Clamp Mechanism

1. Master removal

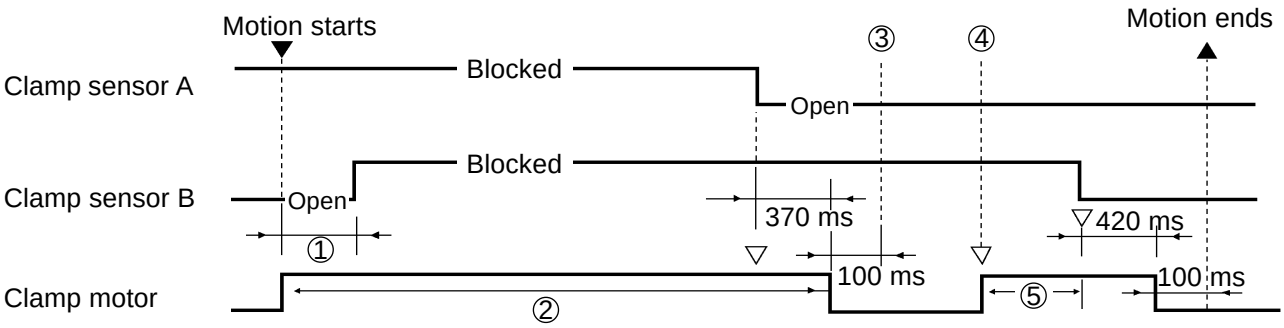
- During the master removal movement, when the Drum comes back to position-A, the leading edge of the new master comes towards the Drum, ready to be clamped.

2. Master clamping

- With the activation of the Clamp motor, the Clamp open arm is pushed down to open the Clamp plate.
- The Clamp motor stops when the light path of Clamp sensor A becomes open and keeps the Clamp plate raised open.
- When the Write pulse motor sends certain set amount of master onto the Drum, the Clamp motor activates to raise the Clamp open arm and close the Clamp plate.
- The Clamp motor turns off when the light paths of both the Clamp sensors A and B becomes open.
  The Clamp unit is back at the Home position.



Master Clamping Timing Chart



① If the light path of the Clamp sensor B is not blocked within **3 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

② If the light path of the Clamp sensor A is not opened within **5 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

③ The Drum waits for the master with the Clamp plate opened.

④ The Clamp motor activates to clamp the master with the Clamp plate when the master loading to the drum is completed.

⑤ If the light path of the Clamp sensor B is not opened within **5 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

6. Master Loading on the Drum Mechanism

As the Write pulse motor activates for a certain set time after the Clamp plate clamps the master, the Main motor activates to load the master on the Drum.

1. Drum angle 79°

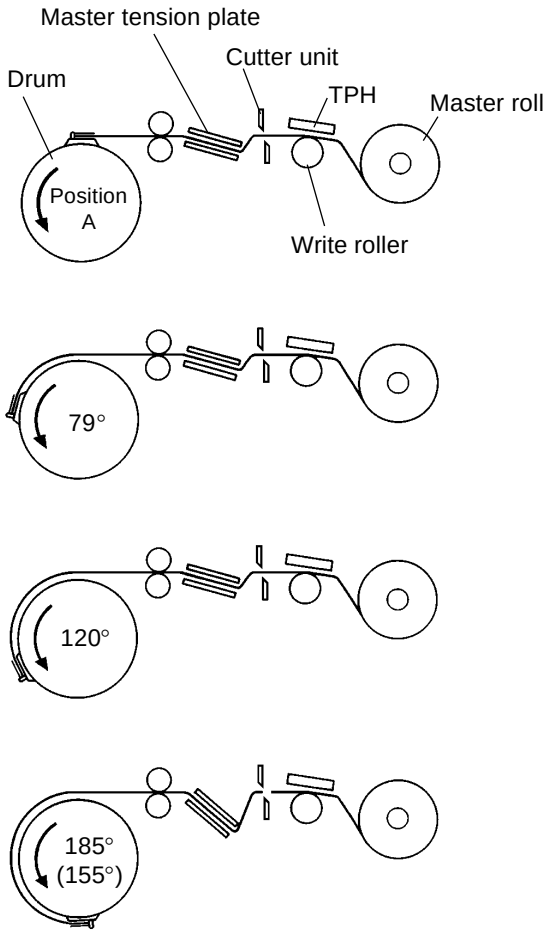
- During the master loading, when the Drum comes to 79°, the Main motor stops and the Master sensor checks for any master loading error.
- The Write pulse motor keep feeding the master, and if no master loading error is detected, the Main motor starts to rotate again.

2. Drum angles 120° and 185°

- The Main motor stops again at Drum 120° and then at 185° to allow Write roller to feed the master towards the Drum.
- On A4 Drum machine, the Main motor stops at Drum 155° instead of 185°.

3. Master cutting

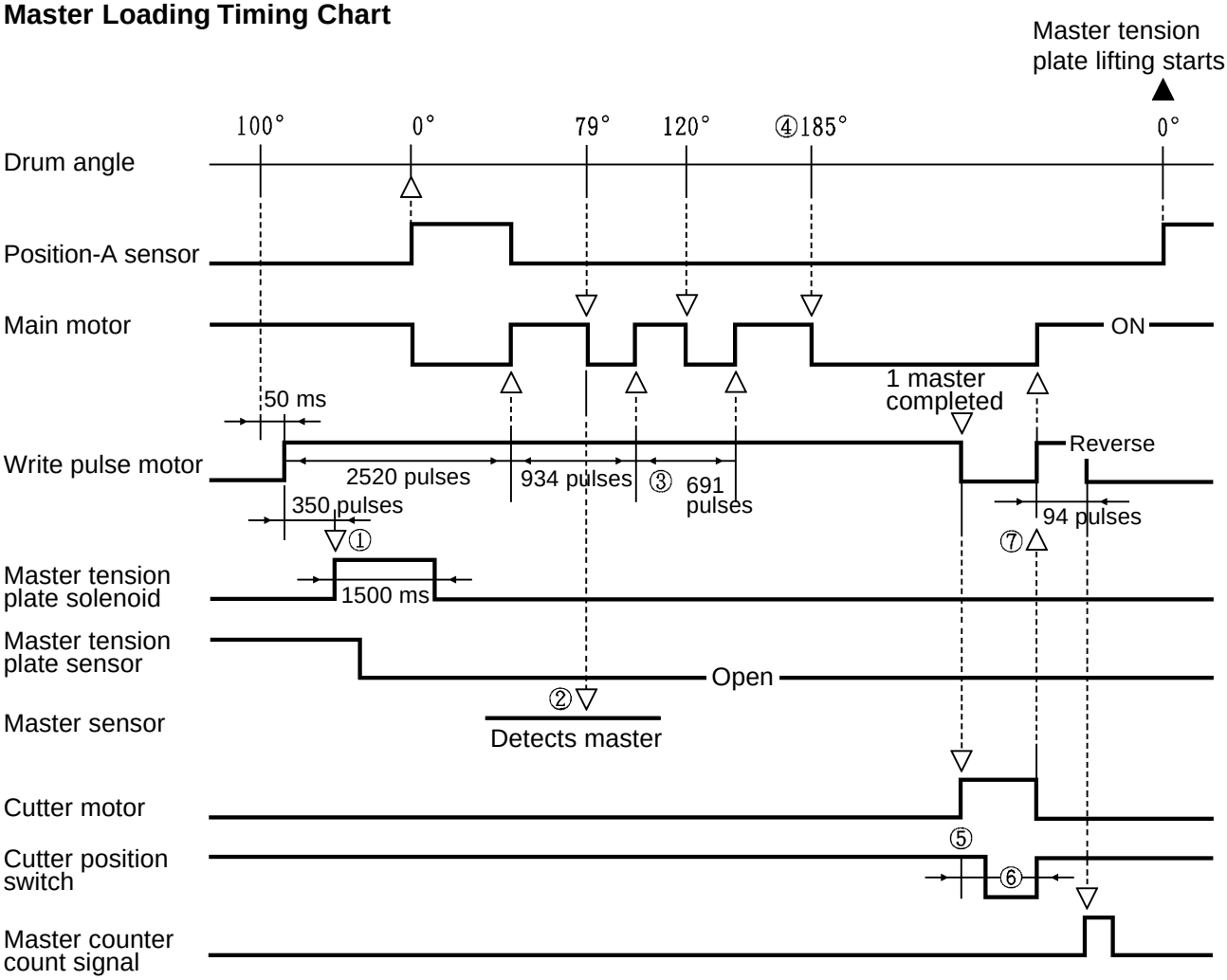
- The Cutter unit cuts the master after one length of master is transferred by the Write roller while the Drum waits at 185° (155° for A4 Drum machine).
- To avoid the master material to stick on the Cutter blade, the Write pulse motor rotates 94 pulses in the opposite direction and pulls the master material back towards the Master roll.
- At the same time the Main motor activates and loads the remaining length of master on the Drum while making one proof print.
- Then the Master tension plate returns to the home position (raised position).



Master Loading Movement

1. After the master is clamped on the Drum and Write pulse motor rotates for a set amount, the Drum rotates to start the master loading.
2. The Drum stops at 79° and checks for any master loading error while the Write pulse motor keeps feeding the master.
3. The Drum stops at 120° to allow the Write pulse motor to feed the master.
4. The Drum stops again at 185° and lets the Write pulse motor to feed remaining length of the master to wards the Drum and for the Cutter to cut the master.
   The Drum rotates again to load the remaining length of the master.
   (155° for A4 Drum machine)

Master Loading Timing Chart



① Master tension plate solenoid is activated to drop the Master tension plate down.

② At Drum **79**°, the Master sensor looks for the master on the Drum.
If master is found on the Drum, the machine memorizes the presence of the master on the Drum.
If no master is found on the Drum, the machine checks the light path of Master tension plate sensor, and if the light path is open, the machine assumes master loading error has occurred and indicates the message **[C 21]**.
If the light path of the Master tension plate sensor is blocked, the machine assumes the Master tension plate has locked and indicates error message **[E 15]**.

③ The Drum angle **185**° (**155**°) is adjustable with Memory Switch **No. 217** (Test Mode No. 217).

④ The maximum master making area is adjustable with memory Switch **No. 205** (Test Mode No. 205).

⑤ If the Cutter position switch is not pressed within **75 ms** after the Cutter motor activates, the machine assumes Cutter motor has locked and indicates error message **[E 13]**.

⑥ If the Cutter position switch is not released within **450 ms** after the Cutter motor activates, the machine assumes Cutter motor has locked and indicates error message **[E 13]**.

⑦ After the Cutter unit cuts the master material, to prevent the master material from jamming on the cutter blades, the Write pulse motor rotates in the reverse direction to pull the leading edge of the master material away from the Cutter unit.

7. Master Tension Plate Lifting Mechanism

When the Drum returns to Position-A after the master loading, the Master tension plate returns to the Home position.

1. Read pulse motor

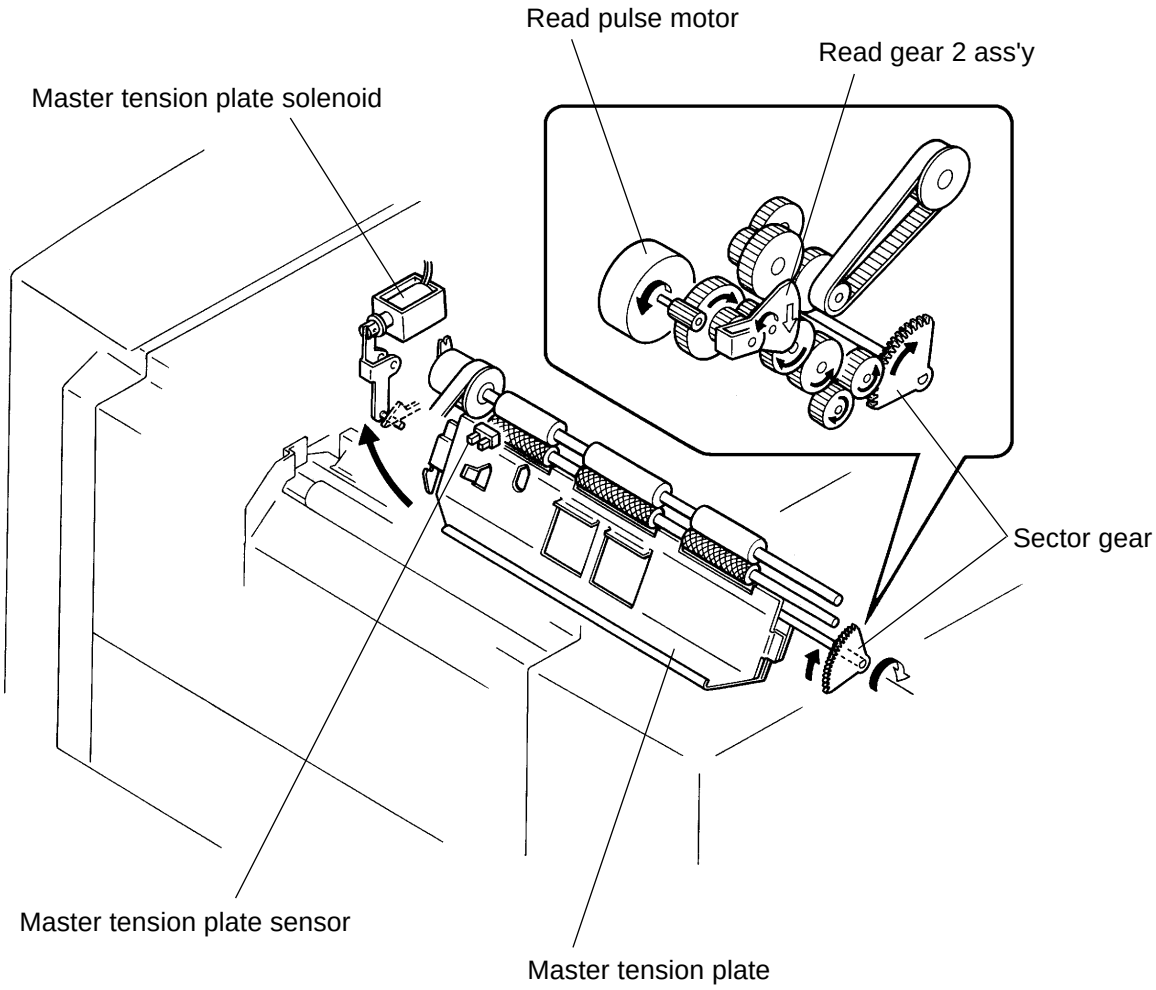
- First, the Read pulse motor rotates in the opposite direction to the normal Original feeding and moves the Read gear 2 ass'y down.
- The Read gear 2 ass'y transfers the Read pulse motor drive to the Sector gear via four gears in between.
- With the rotation of the Sector gear, the Master tension plate lifts up.
- When the Master tension plate blocks the light path of the Master tension plate sensor, the Read pulse motor turns OFF in 10 ms and completes the home positioning movement.

2. Master positioning sensor

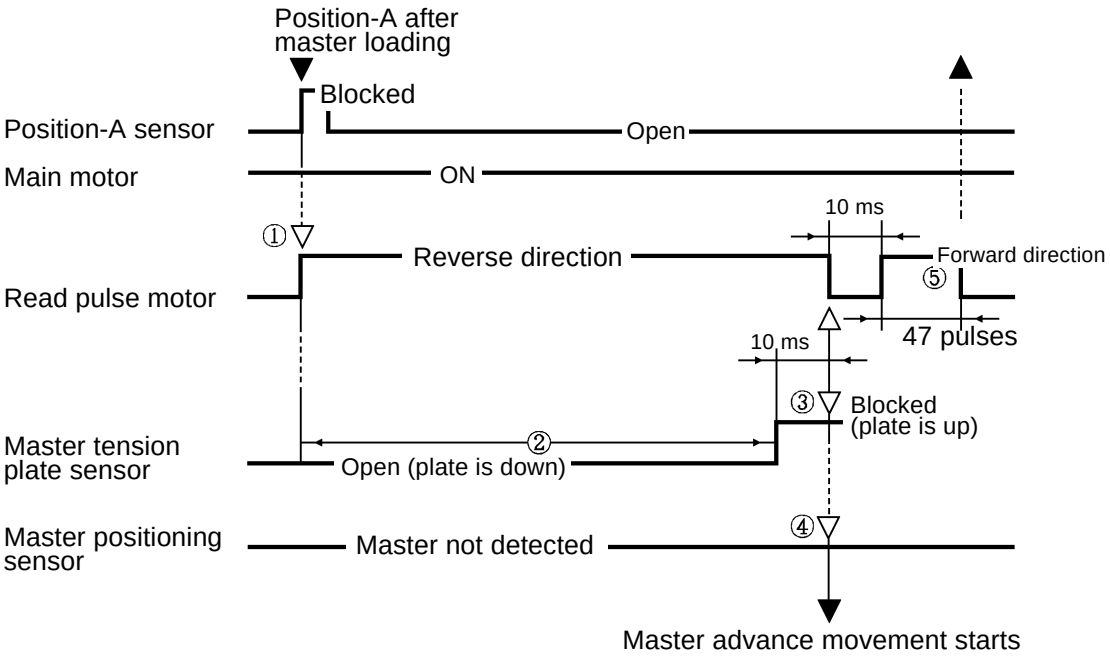
- When the Read pulse motor turns OFF at the completion of the home positioning of the Master tension plate, the Master positioning sensor checks for master cut error.

3. Write pulse motor

- If master cut error is not detected, the Write pulse motor activated to transfer the leading edge of the master material to the master set position (leading edge against the Master stopper gate).



Master Tension Plate Lifting Timing Chart



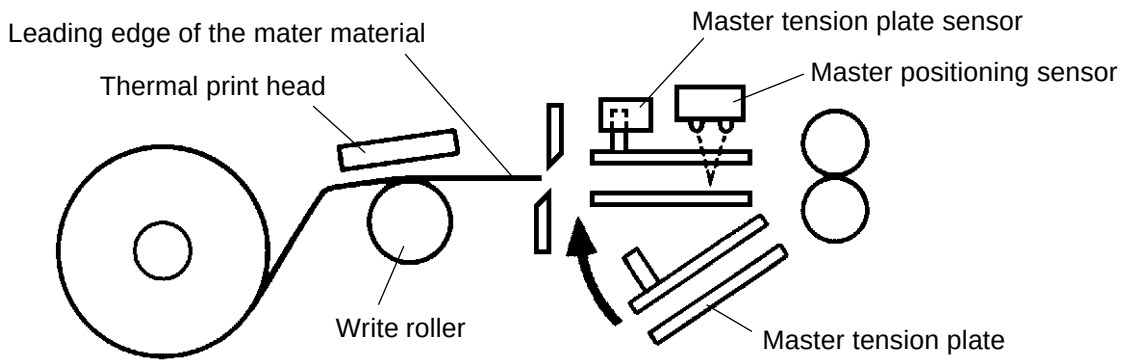
① The Read pulse motor rotates in the opposite direction to lift the Master tension plate.

② If the Master tension plate sensor does not become blocked within **384 pulses** after the Read pulse motor activates, the machine assumes the Master tension plate has locked and indicates error message **[E 15]**.

③ If the Master tension plate sensor is still in "Open" condition after the Read Pulse motor stops, the machine repeats the home positioning movements and checks the condition of the Master tension plate sensor again.
If the Master tension plate sensor is still found to be in "Open" condition, the machine assumes the Master tension plate is locked and indicates the error message **[E 15]**.

④ Master positioning sensor checks for master cut error when the Master tension plate returns to the home position.
If the Master positioning sensor detects master, the machine assumes master cut error has occurred and indicates the message **[C 23]**.
If the Master positioning sensor does not detect any master, the machine assumes the master was cut and advances the master material forward.

⑤ The Read pulse motor rotates in the forward direction (original feeding direction) to engage the Read gear 2 ass'y to the gears which feeds the original.

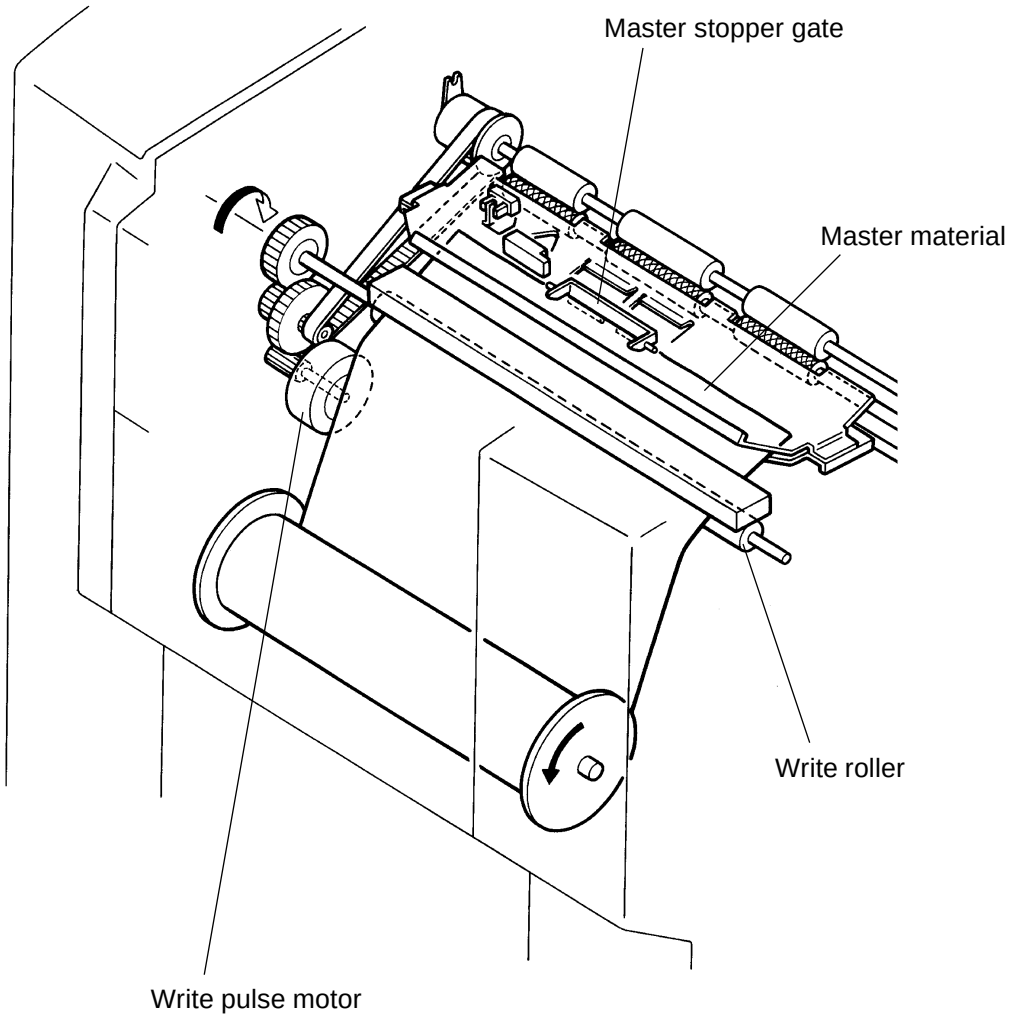


8. Master Advance after Master Cutting

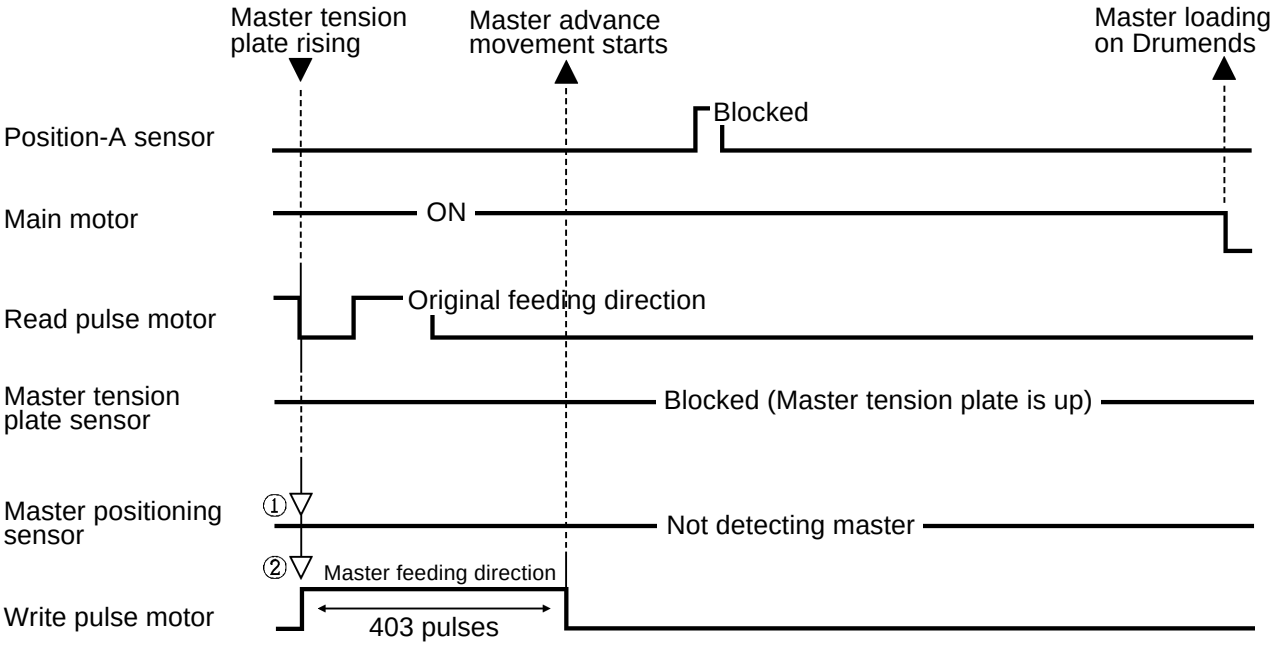
If the master cutting is confirmed by the Master positioning sensor when the Master tension plate is raised after the master cutting, the master material from the master roll is moved forward until the leading edge is in the Master stopper gate area.

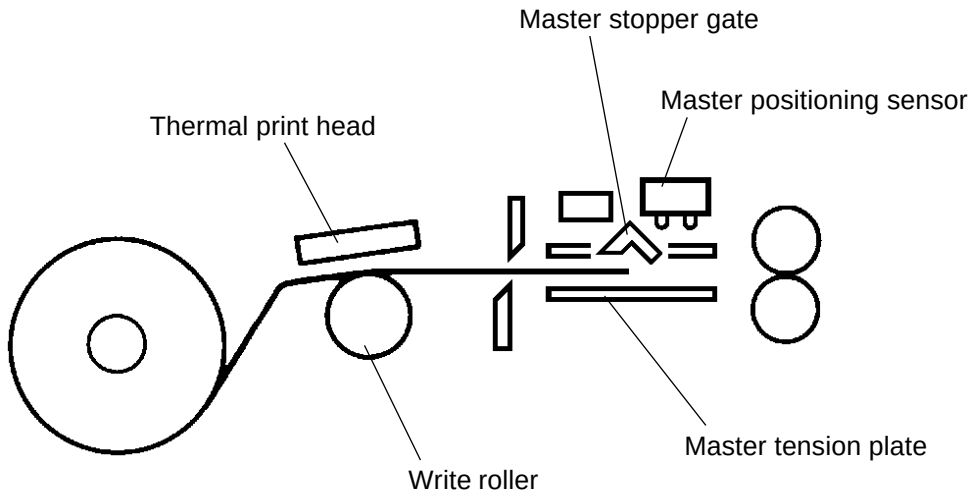
1. Write Pulse Motor

- After the master is cut and Master guide plate is raised, the Write pulse motor rotates to move the master material forward.
- The Write pulse motor activates for 403 pulses, by which time the leading edge of the master material is in the Master stopper gate area.



Master Advance after Master Cutting Timing Chart



① After the Master tension plate is raised and if the Master positioning sensor detects the master material (master is not cut) the master advance movement is not made.

② The master advance movement ends when the Write pulse motor rotates 403 pulses.
The leading edge of the master material stops in the Master stopper gate area.